SECTION 15080

MECHANICAL INSULATION

****

LANL MASTER CONSTRUCTION SPECIFICATION

When editing to suit project, author shall add job-specific requirements and delete only those portions that in no way apply to the activity (e.g., a component that does not apply). To seek a variance from applicable requirements, contact the LEM Mechanical POC.

When assembling a specification package, include applicable specifications from all Divisions, especially Division 1, General Requirements.

Delete information within "stars" during editing.

Specification developed for ML-3 projects. For ML-1 / ML-2, additional requirements and QA reviews are required.

****

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Piping insulation

B. Ductwork insulation

1.2 SUBMITTALS

A. Submit the following in accordance with Section 01330, Submittal Procedures:

1. Catalog data of insulation, jackets, covers, adhesives, coatings, and cements.

1.3 QUALITY ASSURANCE

A. Materials: Flame spread/smoke developed rating of 25/50 or less in accordance with ASTM E84.

B. Provide insulation material 100 percent asbestos free.

1.4 QUALIFICATIONS

A. Installers: Company specializing in performing work of this Section with minimum of 3 years experience.

1.5 DEFINITIONS

A. Finished Areas: Areas where floor, walls, ceilings, trim, or exposed steel are painted, tiled, or similarly finished

B. Unfinished Areas: Areas with unpainted walls.

C. Exposed Areas: Finished areas and other areas used by personnel in the normal use of the building, such as fan rooms, mechanical room, and storage rooms.

D. Concealed Areas: Pipe tunnels, covered pipe trenches, spaces inside walls, duct or pipe shafts, spaces above dropped ceilings, unfinished attic spaces and crawl spaces.

1.6 ENVIRONMENTAL REQUIREMENTS

A. Maintain ambient temperatures and conditions required by manufactures of adhesive, mastic, and insulation cements.

B. Maintain temperature during installation per manufacture's instructions.

PART 2 PRODUCTS

2.1 PRODUCT OPTIONS AND SUBSTITUTIONS

A. Comply with Section 01630, Product Options and Substitutions.

2.2 GENERAL

A. K-factors (thermal conductivity) shown are expressed in BTU•in/hr•ft^2•F.

2.3 MANUFACTURERS

A. Owens/Corning Fiberglass, Armstrong Certainteed, Manville, Halstead, Rubatex, Childers.

B. For ease of identification and comparison, the products of one manufacturer for each application are specified.

2.4 FIBERGLASS PIPE INSULATION

A. Insulation: Rigid molded in compliance with ASTM C547, Class 1, minimum density 3.5 pounds/cubic foot, K-factor of approximately 0.24 at 75 degrees F, suitable for temperatures from minus 20 degrees F to 450 degrees F.

B. Jacket: Factory applied vapor barrier all-service type with self-sealing lap and butt strips.

C. Valves and Fitting Covers: Pre-molded PVC covers with fiber glass insert.

D. Manufacturer: Certainteed 500 Snap-On.

2.5 ELASTOMERIC PIPE INSULATION

A. Insulation: Cellular closed cell in compliance with ASTM C534, Type 1, minimum density 5 pounds/cubic foot, K-factor of approximately 0.29 at 75 degrees F, suitable for temperatures up to 180 degrees F.

B. Valve and fitting covers: Same as pipe insulation, cut to fit.

C. Manufacturer: AP Armaflex

2.6 HYDROUS CALCIUM SILICATE PIPE INSULATION

A. Insulation: Rigid, in compliance with ASTM C533, Type 1, minimum density 13 pounds/cubic foot, K-factor of approximately 0.42 at 200 degrees F, suitable for temperature from 200 degrees F to 1200 degrees F.

B. Valve and Fitting Covers: Same as pipe insulation or "Quick Set" insulating cement.

C. Manufacturer: Owens/Corning Kaylo.

2.7 GLASS FIBER BLANKET DUCT INSULATION

****

Exterior ductwork may also be insulated using duct liner installed inside the ductwork. Refer to Section 15810, Ducts, for liner specification.

****

A. Insulation: Flexible blanket, in compliance with ASTM C612, minimum density 3/4 pounds/cubic foot, K-factor of approximately 0.29 at 75 degrees F, suitable for temperature from 35 degrees F to 250 degrees F.

B. Jacket: Factory applied Foil-Scrim-Kraft (FSK) facing.

C. Fittings: Same material as insulation.

D. Manufacturer: Certainteed standard ductwrap.

2.8 GLASS FIBER BOARD DUCT INSULATION

****

Exterior ductwork may also be insulated using duct liner installed inside the ductwork. Refer to Section 15810, Ducts, for liner specification.

****

A. Insulation: Rigid, in compliance with ASTM C612, Class 1, minimum density 3 pounds/cubic foot, K-factor approximately 0.23 at 75 degrees F, suitable for temperature from minus 20 degrees F to 450 degrees F.

B. Jacket: Factory applied Foil-Scrim-Kraft (FSK) facing.

C. Fitting: Same material as insulation.

D. Manufacturer: Certainteed 1B 300

2.9 METAL JACKETING - PIPING/DUCTWORK

****

In heavy abuse areas, metal jacketing should be used to protect piping or ductwork insulation.

****

A. Jacketing: Aluminum, .016 inches thick, embossed surface, with factory bonded moisture barrier.

B. Valve and Fitting Insulation Covers: Fabricate from same material as jacketing or use prefabricated insulation covers made in two matching halves.

C. Metal Jacketing Bands: 1/2 inch wide, aluminum or stainless.

D. Manufacturer: Childers

2.10 SADDLES (PIPING/TUBING UP TO 2 INCHES)

A. Use 180 degree saddle on systems utilizing teardrop type hangers.

B. Use 360 degree saddle on systems utilizing trapeze hangers or clamps.

C. Saddle: Galvanized steel, 14 gauge and 8 inches long.

2.11 INSERTS AND SHIELDS (PIPING/TUBING OVER 2 INCHES)

A. Use 360 degree calcium silicate insert with a 180 degree shield on systems utilizing clevis or teardrop type hangers.

B. Use 360 degree calcium silicate with a 360 degree shield on systems utilizing trapeze hangers or clamps.

C. The unit shall have an integral moisture barrier consisting of a tri-laminate All-Service Jacket equal and similar to the jacketing on the adjoining insulation.

D. Shield: Galvanized steel, length and gauge in accordance with insert and shield schedule.

E. Insert: Calcium silicate, minimum density 9 pounds/cubic foot, length in accordance with insert and shield schedule.

F. Insert and Shield Schedule

Pipe Size (Inches)	2 to 5	6 to 10	12 to 14	16 to 24
Insert Length (Inches)	6	9	12	18
Shield Length (Inches)	4	6	9	15
Gauge of Steel Shield*	20 ga.	16 ga.	16 ga.	14 ga.

*Bottom shield only; top shield may be one gauge lighter.

G. Manufacturer: Value Engineered Products.

1. Quick-Shield (clevis/teardrop type hangers).

2. Pro-Shield (trapeze type hangers).

3. Weather-shield (outdoor installations).

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that items to be insulated have been pressure tested and approved before applying insulation material.

B. Verify that surfaces are clean, foreign material removed, and dry.

3.2 INSTALLATION - GENERAL

A. Install materials in accordance with manufacturer's instructions.

B. Do not insulate factory-insulated equipment.

C. Do not insulate nameplates.

D. Fit insulation tightly against surface to which it is applied.

E. Do not insulate flexible connections.

F. Continue insulation and vapor barrier through penetrations except where walls or floors are required to be firestopped or required to have a fire resistive rating.

G. Weatherproof outdoor installations of piping or ductwork covered with aluminum jacket. Provide watershed lap joints and seal with mastic as required.

H. Do not install metal jacketing with raw edges; provide a safety edge.

3.3 INSTALLATION - PIPING

A. On exposed piping located in finished areas, locate cover seams in least visible area.

B. Provide continuous insulation through pipe hangers or supports.

C. Where insulation terminates, taper to pipe and finish with insulating cement or acrylic mastic.

D. Cover insulated pipes located outdoors or in utility tunnels with aluminum jacket. Secure with aluminum bands and screws as required.

E. Tape circumferential joints of pipe insulation with 3 inch wide white vinyl tape.

F. Insulate fitting and valves where required with same material thickness as specified for adjacent pipe.

G. Insulate potable and non-potable cold water piping within walls, chases, or ceiling plenums where return air is present.

H. Insulate potable and non-potable cold water piping in equipment rooms.

I. Do not insulate unions, flanges and valves in potable or non-potable piping systems of 140 degrees F or less, except for chilled water.

J. Insulate refrigerant discharge line (hot gas discharge) when there is a danger of personnel coming in contact with piping or when the line is passing through a conditioned space. Insulate refrigerant liquid line when it is passing through spaces having temperatures greater than the refrigerant condensing temperatures.

3.4 INSTALLATION - DUCTWORK

A. Secure rigid board insulation to ductwork with metal fasteners (stick-klip) and scrim washer on 12 inch centers each way. Secure fasteners to duct work with recommended adhesive.

B. Tape ductwork insulation joints and penetrations caused by mechanical fasteners with 3 inch wide FSK tape.

C. Cover insulated ductwork located outdoors with aluminum jacketing. Secure with bands and screws as required.

3.5 INSULATION SCHEDULE

A. HVAC Piping Systems: Use fiberglass pipe insulation. NOTE: For piping exposed to outdoor temperatures, increase thickness 1/2 inch.

Service	Nominal Pipe Diameter (inches)	Insulation Thickness (inches)
Steam (to 15 psi)	Up to 2 2 1/2 to 6 over 6	1 1/2 2 3 1/2
Steam (above 15 psi to 125 psi)	Up to 1 1 1/4 to 4 over 4	2 2 1/2 3 1/2
Condensate	Up to 1 1/2 2 to 4 over 4	1 1/2 2 2 1/2
Heating hot water (to 200 degrees F)	All sizes	1 1/2
Potable hot water (105 degrees F & greater)	Up to 2 over 2	1 1 1/2
Non-potable hot water (105 degrees F & greater)	Up to 2 over 2	1 1 1/2

Service	Nominal Pipe Diameter (inches)	Insulation Thickness (inches)
Refrigerant suction	All sizes	1
Refrigerant discharge	All sizes	1
Refrigerant liquid	All sizes	1
Chilled water (40-55 degrees F)	All sizes	1
Potable cold water	All sizes	1
Non-potable cold water	All sizes	1
Tower water	All sizes	1
Roof drain bowl and storm water piping	All sizes	1

B. Handicapped Lavatory Piping: Use elastomeric pipe insulation:

Service	Pipe Sizes (inches)	Insulation Thickness (inches)
Exposed drain and hot water lines	All sizes	1/2

C. Exhaust Piping: Use hydrous calcium silicate insulation. Wrap with aluminum jacketing.

Service	Insulation Thickness (inches)
Generator Exhaust Piping/Muffler	1 1/2

D. Concealed Ductwork: Use glass fiber (flexible) duct insulation.

Service	Insulation Thickness (inches)
Supply and return air	1 1/2

E. Exposed Rectangular Ductwork: Use glass fiberboard (rigid) duct insulation on the exterior of the ductwork. NOTE: Use 2 inch thick insulation for ductwork exposed to outdoor temperatures.

Service	Insulation Thickness (inches)
Supply and return air	1 1/2

F. Exposed Round Ductwork: Use glass fiber (flexible) duct insulation. NOTE: Use 2 inch thick insulation for ductwork exposed to outdoor temperatures.

Service	Insulation Thickness (inches)
Supply and return air	1 1/2

END OF SECTION